gain: The ratio of output current, voltage, or power to input current, voltage, or power, respectively. (188) *Note 1:* Gain is usually expressed in dB. *Note 2:* If the ratio is less than unity, the gain, expressed in dB, will be negative, in which case there is a loss between input and output.

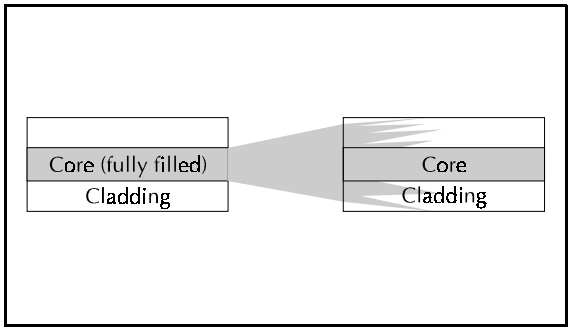
gain hit: *See* **hit**.

gain medium: An active medium, device, or system in which amplification of input occurs with or without feedback. *Note:* Gain media include amplifiers, lasers, and avalanche photodiodes (APDs).

gain of an antenna: *Synonym* **antenna gain.**

galactic radio noise: *Synonym* **cosmic noise**.

gap loss: 1. The power loss that occurs when an optical signal is transferred from one fiber to another that is axially aligned with it, but longitudinally separated from it. *Note:* The gap allows light from the "transmitting" fiber to spread out as it leaves the fiber endface. When it strikes the "receiving" fiber, some of the light will enter the cladding, where it is quickly lost. [After FAA] **2**. An analogous form of coupling loss that occurs between an optical source, *e.g.*, an LED, and an optical fiber. *Note:* Gap loss is not usually significant at the optical detector, because the sensitive area of the detector is normally somewhat larger than the cross section of the fiber core. Unless the separation is substantial, all light emerging from the fiber, even though it diverges, will still strike the detector. *Synonym* **longitudinal offset loss.** [FAA]



gap loss

gap-loss attenuator: An optical attenuator that exploits the principle of gap loss to reduce the optical power level when inserted in-line in the fiber path; *e.g.*, to prevent saturation of the receiver. *Note:* Gap-loss attenuators should be used in-line near the optical transmitter. [After FAA]

garble: 1. An error in transmission, reception, encryption, or decryption that changes the text of a message or any portion thereof in such a manner that it is incorrect or undecryptable. [JP1] **2.** In a telephone circuit or channel, readily audible but unintelligible interference from another circuit or channel. *Note:* Garble may, for example, take place in an FDM telephone carrier system in which an interfering signal from another channel or system is demodulated in such a fashion that it has an objectionable audio power level but is nonetheless unintelligible.

gate: 1. A device having one output channel and one or more input channels, such that the output channel state is completely determined by the input channel states, except during switching transients. **2.** One of many types of combinational logic elements having at least two inputs; *e.g.*, AND, OR, NAND, and NOR. (188)

gateway: 1. In a communications network, a network node equipped for interfacing with another network that uses different protocols. (188) *Note 1:* A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires that mutually acceptable administrative procedures be established between the two networks. *Note 2:* A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions. **2.** *Loosely*, a computer configured to perform the tasks of a gateway.

gating: 1. The process of selecting only those portions of a wave between specified time intervals or between specified amplitude limits. **2.** The controlling of signals by means of combinational logic elements. (188) **3.** A process in which a predetermined set of conditions, when established, permits a second process to occur. (188)

gaussian beam: A beam of light whose electric field intensity distribution is gaussian. *Note:* When such a beam is circular in cross section the intensity at distance r from the center, $E(r)$, is given by

$$E(r) = E(0)\, e^{(-r/w)^2} ,$$

where $E(0)$ is the electrical field strength at the beam center, *i.e.*, at $r = 0$; and w is the value of r at which the intensity is 1/e of its value on the axis.

gaussian pulse: A pulse that has a waveform described by the gaussian distribution. (188) *Note:* In the time domain, the amplitude of the waveform is given by

$$f(t) = A\, e^{(-t/\sigma)^2} ,$$

where A is the maximum amplitude, and σ is the pulse half-duration at the 1/e points.

GBH: *Abbreviation for* **group busy hour**.

GCT: *Abbreviation for* **Greenwich Civil Time**. *See* **Coordinated Universal Time.**

GDF: *Abbreviation for* **group distribution frame.**

gel: 1. A substance, resembling petroleum jelly in viscosity, that surrounds a fiber, or multiple fibers, enclosed in a loose buffer tube. *Note:* This gel serves to lubricate and support the fibers in the buffer tube. It also prevents water intrusion in the event the buffer tube is breached. [FAA] **2**. Index-matching material in the form of a gel. [FAA] *Synonym* **index-matching gel.** *See* **index-matching material.**

general purpose computer: A computer designed to perform, or that is capable of performing, in a reasonably efficient manner, the functions required by both scientific and business applications. *Note:* A general purpose computer is often understood to be a large system, capable of supporting remote terminal operations, but it may also be a smaller computer, *e.g.*, a desktop workstation.

general purpose network: *See* **common user network.**

geometric optics: The branch of optics that describes light propagation in terms of rays. *Note 1:* Rays are bent at the interface between two dissimilar media, and may be curved in a medium in which the refractive index is a function of position. *Note 2:* The ray in geometric optics is perpendicular to the wavefront in physical optics. *Synonym* **ray optics.**

geometric spreading: *See* **inverse-square law.**

geostationary orbit: A circular orbit in the equatorial plane, any point on which revolves about the Earth in the same direction and with the same period as the Earth's rotation. (188) *Note:* An object in a geostationary orbit will remain directly above a fixed point on the equator at a distance of approximately 42,164 km from the center of the Earth, *i.e.*, approximately 35,787 km above mean sea level.

geostationary satellite: A geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator and which thus remains fixed relative to the Earth; by extension, a satellite that remains approximately fixed relative to the Earth. [NTIA] [RR]

geostationary satellite orbit: The orbit in which a satellite must be placed to be a geostationary satellite. [NTIA] [RR]

geosynchronous orbit: Any orbit about the Earth, which orbit has a period equal to the period of rotation of the Earth about its axis, and in the same sense, *i.e.*, direction, as the rotation of the Earth.

germanium photodiode: A germanium-based PN- or PIN-junction photodiode. *Note 1:* Germanium photodiodes are useful for direct detection of optical wavelengths from approximately 1 µm to several tens of µm. *Note 2:* Germanium-based detectors are noisier than silicon-based detectors. Silicon-based detectors are therefore usually preferred for wavelengths shorter than 1 µm. [After FAA]

ghost: A secondary image or signal resulting from echo, envelope delay distortion, or multipath reception.

gigaflop: A billion, *i.e.*, 10^9, floating point operations per second.

gigahertz (GHz): A unit of frequency denoting 10^9 Hz. (188)

glare: *Deprecated synonym for* **call collision.**

glass: **1**. In the strict sense, a state of matter. [FAA] **2.** In fiber-optic communication, any of a number of noncrystalline, amorphous inorganic substances, formed, by heating, from metallic or semiconductor oxides or halides, and used as the material for fibers. *Note:* The most common glasses are based on silicon dioxide (SiO_2). [After FAA]

glide slope facility: In aeronautical navigation, an instrument approach landing facility that furnishes vertical guidance information to an aircraft from its approach altitude down to the surface of the runway. (188)

global: **1.** Pertaining to, or involving, the entire world. (188) **2.** Pertaining to that which is defined in one subsection of an entity and used in at least one other subsection of the same entity. (188) **3.** In computer, data processing, and communications systems, pertaining to what is applicable to an area beyond the immediate area of consideration. *Note:* Examples of global entities are (a) in computer programming, an entity that is defined in one subdivision of a computer program and used in at least one other subdivision of that program and (b) in personal computer systems and their software packages, a setting, definition, or condition that applies to the entire software system. [From Weik '89]

global address: In a communications network, the predefined address that is used as an address for all users of that network, and that may not be the address of an individual user, or subgroup of users, of the network.

global status: **1.** The set of attributes of an entity, described at a particular time, when that set is extended to every occurrence of that entity within a prescribed boundary. (188) **2.** The complete set of attributes necessary to describe an entity at a particular time. (188)

GMT: *Abbreviation for* **Greenwich Mean Time**. *Obsolete term. See* **Coordinated Universal Time.**

go-ahead message: *Synonym* **go-ahead notice.**

go-ahead notice: In a tape-relay communications system, a service message, usually sent to a relay station or to a tributary station, that contains a request to the operator to resume transmitting over a specified channel or channels. [From Weik '89] *Synonyms* **go-ahead message, start message, start notice.**

go-ahead tone: In communications systems, an audible signal transmitted by a system indicating that the system is ready to receive a message or signal. [From Weik '89]

gold code: In spread-spectrum systems, a code that is generated by summing, using modulo-two addition, the outputs of two spread-spectrum code-sequence generators. [From Weik '89]

Gopher: A menu-based information searching tool that allows users to access various types of databases, such as FTP archives and white pages databases. *Note 1:* Gopher is most often used as an Internet browser. *Note 2:* Gopher software uses the client-server model.

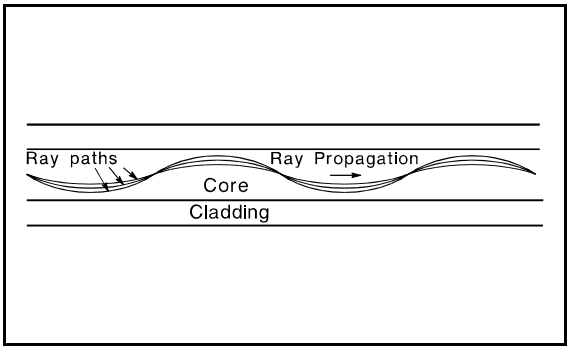
GOS: *Abbreviation for* **grade of service**.

GOSIP: *Acronym for* **Government Open Systems Interconnection Profile.** A definition of Federal Government functional requirements for open systems computer network products, including a common set of Open System Interconnection (OSI) data communication protocols that enables systems developed by different vendors to interoperate and enable the users of different applications on these systems to exchange information. *Note 1:* The OSI protocols were developed primarily by ISO and CCITT. *Note 2:* The GOSIP is a subset of the OSI protocols and is based on agreements reached by vendors and users of computer networks participating in the National Institute of Standards and Technology (NIST) Implementors Workshop. *Note 3:* The GOSIP is described in the latest version of FIPS PUB 146.

Government Open Systems Interconnection Profile: *See* **GOSIP.**

graceful degradation: Degradation of a system in such a manner that it continues to operate, but provides a reduced level of service rather than failing completely. (188)

graded-index fiber: An optical fiber with a core having a refractive index that decreases with increasing radial distance from the fiber axis. (188) *Note:* The most common refractive index profile for a graded-index fiber is very nearly parabolic. The parabolic profile results in continual refocusing of the rays in the core, and compensates for multimode distortion.



ray paths in a graded-index fiber

graded-index profile: In the core of an optical fiber, a plot of the variation of refractive index such that the refractive index decreases with increasing radial distance from the fiber axis.

grade of service (GOS): **1.** The probability of a call's being blocked or delayed more than a specified interval, expressed as a decimal fraction. (188) *Note:* Grade of service may be applied to the busy hour or to some other specified period or set of traffic conditions. Grade of service may be viewed independently from the perspective of incoming versus outgoing calls, and is not necessarily equal in each direction. **2.** In telephony, the quality of service for which a circuit is designed or conditioned to provide, *e.g.*, voice grade or program grade. *Note:* Criteria for different grades of service may include equalization for amplitude over a specified band of frequencies, or in the case of digital data transported via analog circuits, equalization for phase also.

grandfathered systems: Systems, including but not limited to, (a) PBX and key telephone systems, directly connected to the public switched telephone network on June 1, 1978, that may remain permanently connected thereto without registration unless subsequently modified, and (b) systems that are of the same type as those connected to the public switched telephone network on July 1, 1978, that were added before January 1, 1980, and that may remain permanently connected thereto without registration unless subsequently modified.

grandfathered terminal equipment: Terminal equipment (other than PBX and key telephone systems) and protective circuitry connected to the public switched telephone network before July 1, 1978, that may remain connected thereto for life without registration unless subsequently modified.

graphical user interface (GUI): A computer program or environment that displays options on the screen as icons, *i.e.*, picture symbols, by which users enter commands by selecting an icon. *Note:* Icons may be selected, *e.g.*, by pressing the <ENTER> key on the keyboard, by "clicking" a computer mouse button, or by touching the icon on a touch pad.

graphic character: **1.** A visual representation of a character, other than a control character. **2.** In the ASCII code, a character other than an alphanumeric character, intended to be written, printed, or otherwise displayed in a form that can be read by humans. *Note 1:* Graphic characters are contained in rows 2 through 7 of the ASCII code table. *Note 2:* The space and delete characters are considered to be graphic characters.

graphics: The art or science of conveying information through the use of display media, such as graphs, letters, lines, drawings, and pictures. (188) *Note:* Graphics includes the transmission of coded images such as facsimile.

Gray code: A binary code in which consecutive decimal numbers are represented by binary expressions that differ in the state of one, and only one, one bit. *Synonym* **reflected code.**

gray scale: An optical pattern consisting of discrete steps or shades of gray between black and white. (188)

great circle: A circle defined by the intersection of the surface of the Earth and any plane that passes through the center of the Earth. *Note:* On the idealized surface of the Earth, the shortest distance between two points lies along a great circle.

Greenwich Civil Time (GCT): *Synonym* **Greenwich Mean Time (GMT).** *Obsolete term. See* **Coordinated Universal Time.**

Greenwich Mean Time (GMT): Mean solar time at the meridian of Greenwich, England, formerly used as a basis for standard time throughout the world. (188) *Obsolete term. Synonym* **Greenwich Civil Time.** *See* **Coordinated Universal Time.**

ground: 1. An electrical connection to earth through an earth-electrode subsystem. (188) **2.** In an electrical circuit, a common return path that usually (a) is connected to an earth-electrode subsystem and (b) is extended throughout a facility via a facility ground system consisting of the signal reference subsystem, the fault protection subsystem, and the lightning protection subsystem. **3.** In an electrical circuit, a common return path that (a) may not necessarily be connected to earth and (b) is the zero voltage reference level for the equipment or system.

ground absorption: The dissipation of rf energy by the Earth. (188)

ground constants: The electrical parameters of earth, such as conductivity, permittivity, and magnetic permeability. *Note 1:* The values of these parameters vary with the local chemical composition and density of the earth. *Note 2:* For a propagating electromagnetic wave, such as a surface wave propagating along the surface of the Earth, these parameters vary with frequency and direction. (188)

ground current: In the presence of an electrical fault, the current that flows in the protective ground wire of a power distribution system. *Contrast with* **ground loop.**

ground loop: In an electrical system, an unwanted current that flows in a conductor connecting two points that are nominally at the same potential, *i.e.*, ground, but are actually at different potentials. *Note 1:* For example, the electrical potential at different points on the surface of the Earth can vary by hundreds of volts, primarily from the influence of the solar wind. Such an occurrence can be hazardous, *e.g.*, to personnel working on long grounded conductors such as metallic telecommunications cable pairs. *Note 2:* A ground loop can also exist in a floating ground system, *i.e.*, one not connected to an Earth ground, if the conductors that constitute the ground system have a relatively high resistance, or have, flowing through them, high currents that produce a significant voltage ("I•R") drop. *Note 3:* Ground loops can be detrimental to the operation of the electrical system. *Contrast with* **ground current.**

ground plane: An electrically conductive surface that serves as the near-field reflection point for an antenna. *Note:* A ground plane may consist of a natural (*e.g.*, Earth or sea) surface, an artificial surface of opportunity (*e.g.*, the roof of a motor vehicle), or a specially designed artificial surface (*e.g.*, the disc of a discone antenna). (188)

ground potential: The zero reference level used to apply and measure voltages in a system. *Note:* A potential difference may exist between this reference level and the ground potential of the Earth, which varies with locality, soil conditions, and meteorological phenomena.

ground-return circuit: 1. A circuit using a common return path that is at ground potential. *Note:* Earth may serve as a portion of the ground-return circuit. **2.** A circuit in which there is a common return path, whether or not connected to earth.

ground start: A method of signaling from a terminal or subscriber loop to a switch, in which method one side of a cable pair is temporarily grounded. (188)

ground wave: In radio transmission, a surface wave that propagates close to the surface of the Earth. *Note 1:* The Earth has one refractive index and the atmosphere has another, thus constituting an interface that supports surface wave transmission.

These refractive indices are subject to spatial and temporal changes. *Note 2:* Ground waves do not include ionospheric and tropospheric waves.

group: **1.** In frequency-division multiplexing, a specific number of associated voice channels, either within a supergroup or as an independent entity. *Note 1:* In wideband systems, a group usually consists of 12 voice channels and occupies the frequency band from 60 kHz to 108 kHz. *Note 2:* this is CCITT group B. *Note 3*: CCITT Basic Group A, for carrier telephone systems, consists of 12 channels occupying upper sidebands in the 12-kHz to 60-kHz band. Basic Group A is no longer mentioned in CCITT Recommendations. *Note 4:* A supergroup usually consists of 60 voice channels, *i.e.*, 5 groups of 12 voice channels each, occupying the frequency band from 312 kHz to 552 kHz. (188) *Note 5:* A mastergroup consists of 10 supergroups or 600 voice channels. (188) *Note 6:* The CCITT standard mastergroup consists of 5 supergroups. The U.S. commercial carrier standard mastergroup consists of 10 supergroups. *Note 7:* The terms "supermaster group" or "jumbo group" are sometimes used to refer to 6 mastergroups. **2.** A set of characters forming a unit for transmission or cryptographic treatment. (188)

group address: In a communications network, a predefined address used to address only a specified set of users. *Synonym* **collective address.**

group alerting and dispatching system: A service feature that (a) enables a controlling telephone to place a call to a specified number of telephones simultaneously, (b) enables the call to be recorded, (c) if any of the called lines is busy, enables the equipment to camp on until the busy line is free, and (d) rings the free line and plays the recorded message.

group busy hour (GBH): The busy hour for a given trunk group.

group delay: **1.** The rate of change of the total phase shift with respect to angular frequency, $d\theta/d\omega$, through a device or transmission medium, where θ is the total phase shift, and ω is the angular frequency equal to $2\pi f$, where f is the frequency. **2.** In an optical fiber, the transit time required for optical power, traveling at a given mode's group velocity, to travel a given distance. *Note:* For optical fiber dispersion measurement purposes, the quantity of interest is group delay per unit length, which is the reciprocal of the group velocity of a particular mode. The measured group delay of a signal through an optical fiber exhibits a wavelength dependence due to the various dispersion mechanisms present in the fiber.

group delay time: In a group of waves that have slightly different individual frequencies, the time required for any defined point on the envelope (*i.e.*, the envelope determined by the additive resultant of the group of waves) to travel through a device or transmission facility. (188)

group distribution frame (GDF): In frequency-division multiplexing, a distribution frame that provides terminating and interconnecting facilities at the group level, *i.e.*, group modulator output and group demodulator input circuits of FDM carrier equipment. *Note:* The basic spectrum of the FDM group is 60 kHz to 108 kHz. (188)

group index (*N*): In fiber optics, for a given mode propagating in a medium of refractive index η, the velocity of light in vacuum, c, divided by the group velocity of the mode. (188) *Note:* For a plane wave of wavelength λ, the group index may also be expressed,

$$N = n - \lambda \frac{dn}{d\lambda} \quad ,$$

where n is the phase index of wavelength λ.

grouping factor: *Synonym* **blocking factor.**

group 1. . . 4 facsimile: *See* **facsimile.**

group patch bay: *See* **patch bay.**

group velocity: **1.** The velocity of propagation of an envelope produced when an electromagnetic wave is modulated by, or mixed with, other waves of different frequencies. (188) *Note:* The group velocity is the velocity of information propagation and, loosely, of energy propagation. **2.** In optical fiber transmission, for a particular mode, the

reciprocal of the rate of change of the phase constant with respect to angular frequency. *Note:* The group velocity equals the phase velocity if the phase constant is a linear function of the angular frequency, $\omega = 2\pi f$, where f is the frequency. **3.** In optical-fiber transmission, the velocity of the modulated optical power.

***G/T*:** *Abbreviation for* **antenna gain-to-noise-temperature.**

guard band: *See* **frequency guard band, time guard band.**

guarded frequency: A transmission frequency that is not to be jammed or interfered with because of the value of the information being derived from it. *Note:* For example, a guarded frequency will not be jammed when the tactical, strategic, and technical information that can be obtained from the transmissions outweighs the potential operational gain achieved by jamming. [From Weik '89]

guided mode: *Synonym* **bound mode**.

guided ray: In an optical fiber, a ray that is confined primarily to the core. *Note:* A guided ray satisfies the relation given by

$$0 \leq \sin \theta_r \leq \sqrt{n_r^2 - n_a^2} \quad ,$$

where θ_r is the angle the ray makes with the fiber axis, r is the radial position, *i.e.*, radial distance, of the ray from the fiber axis, n_r is the refractive index at the radial distance r from the fiber axis, and n_a is the refractive index at the core radius, a, *i.e.*, at the core-cladding interface. Guided rays correspond to bound modes, *i.e.*, guided modes, in terms of modes rather than rays. (188) *Synonyms* **bound ray, trapped ray.**

guided wave: A wave having (a) energy concentrated near a boundary, or between substantially parallel boundaries, separating materials of different properties and (b) a direction of propagation effectively parallel to these boundaries. (188)

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